THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 22

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAN J. VAN DEN BROEK
and ANTON HEGER

Appeal No. 1997-4442
Application 08/353,040[1]

ON BRIEF

Before KRASS, BARRETT, and HECKER, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

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[1] Application for patent filed December 9, 1994, entitled (as amended in Paper No. 10) "Electric Resistor Having Positive And Negative TCR Portions," which claims the foreign filing priority benefit under 35 U.S.C. § 119 of Belgian patent application 09301372, filed December 10, 1993.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the Examiner's refusal to allow claims 2-6.

We reverse.

BACKGROUND

The disclosed invention relates to precision resistors having accurate and readily reproducible values of resistance and temperature coefficient of resistance ("TCR").

Claim 6 is reproduced below.[2]

> 6. A resistor comprising an electrically insulating substrate having two connections which are electrically interconnected by means of a resistance path, said resistance path comprising a first resistance alloy portion with a positive TCR and a second resistance alloy portion with a negative TCR, and wherein the difference in the resistance values between first and second alloy portions is maximally a factor of 10 and the difference in the absolute values of the TCR between first and second alloy portions is maximally a factor of 10, the first and second portions both being trimmed so that the resistor has a desired resistance value and a desired TCR.

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[2] As noted by the Examiner, "TRC" in claim 6 (four places) in the amendment after final rejection (Paper No. 13) filed October 29, 1996, and in the appendix to the brief, should be "TCR" to be consistent with claim 6 as originally presented in the amendment (Paper No. 10) filed February 26, 1996. We reproduce the claim with the correction.

The Examiner relies on Appellants' admitted prior art (APA) that laser trimming of resistors was known (specification, page 1, line 25, to page 2, line 2, describing U.S. Patent 4,907,341 to Chapel, Jr. et al. (Chapel)) and the following prior art references:

Mcquaid et al. (Mcquaid)	4,746,896	May 24, 1988
Drabkin	5,039,976	August 13, 1991
Sahagen	5,088,329	February 18, 1992
de Wit	5,448,103	September 5, 1995 (effective filing date May 19, 1992)

Claims 2 and 6 stand rejected under 35 U.S.C. § 102(e) as anticipated by de Wit or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over de Wit in view of the APA.

Claims 3 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over de Wit, APA, further in view of Mcquaid.[3]

[3] In the Final Rejection, the Examiner rejected claims 3-5 over de Wit, APA, Mcquaid, and Sahagen. Sahagen was applied only against claim 4 to show TiW as a bonding agent. The rejection of claim 4 and the reliance on Sahagen have been withdrawn.

Claims 2-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Drabkin and Sahagen. This is a new ground of rejection added in the Examiner's Answer.

We refer to the Final Rejection (Paper No. 11), the Examiner's Answer (Paper No. 16) (pages referred to as "EA__"), and the Examiner's Supplemental Answer (Paper No. 18) for a statement of the Examiner's position and to the Brief (Paper No. 15) (pages referred to as "Br__"), the Reply Brief (Paper No. 17) (pages referred to as "RBr__"), and the Supplemental Reply Brief (Paper No. 19) for Appellants' arguments thereagainst.

OPINION

Independent claim 6 and dependent claim 3 are argued separately. Thus, claim 2 stands or falls together with claim 6 and claims 4 and 5 stand or fall together with claim 3.

Anticipation - Dewit

De Wit discloses (e.g., figures 1 and 4) a temperature independent resistor circuit comprising a first resistor R_1 with a positive TCR and a second resistor R_2 having a negative TCR. When the resistances are coupled together, the

temperature dependence is eliminated (e.g., col. 4, lines 20-22). De Wit discloses that the resistors are formed by an n-well resistor (formed by n-well region 14) and a polysilicon resistor (formed by polysilicon layer 16), but states (col. 4, lines 23-29): "The general concept can be expanded beyond an n-well resistor and a polysilicon resistor. . . . In general, any two (or more) resistors which have different temperature dependencies can be used." De Wit discloses a resistance value of 1350 S/square and a first order TCR of 5923.82 ppm/EC for R_1 and a resistance value of 400 S/square and a first order TCR of -1725.9 ppm/EC for R_2 (col. 4, lines 6 and 9). Thus, de Wit discloses first and second resistances having a difference of resistance values less than 10 and a difference in absolute values of the TCR of less than 10. Appellants' arguments that de Wit does not address maximum differences in resistance and the absolute values of TCR (Br5; RBr2, second para.) are not persuasive. De Wit's teaching of values within the claimed ranges of a maximum factor of 10 is sufficient to anticipate these limitations.

De Wit further discloses that substrate 12 may be a semiconductor substrate or a semiconductor layer grown or deposited on another semiconductor layer or on an insulating layer (col. 2, lines 60-65). Appellants argue that de Wit does not have an electrically insulating substrate (Br5), but "suggests a semiconductor layer substrate formed on an insulating layer" (RBr2 n.1). The distinction between an insulating "layer" and an insulating "substrate" is not addressed by the Examiner. However, we find that an insulating layer on a substrate broadly constitutes an insulating substrate.

Appellants argue that the materials of the first and second resistors in de Wit do not contain metals, whereas claim 6 recites that the resistance path has two alloy portions (Br5). The Examiner acknowledges the argument but does not answer it (EA5). De Wit does not disclose alloy resistances. Although de Wit discloses that the concept is applicable to any kind of resistor, it does not contain any teaching of the construction of other kinds of resistors. The anticipation rejection of claims 6 and 2 is reversed for this reason.

Appellants also argue that de Wit does not mention trimming, whereas claim 6 recites that the first and second path portions are trimmed so that the resistor has a desired resistance value and a desired TCR (Br6; RBr2 n.1). The Examiner responds that "[t]rimming resistors to achieve a desired value is extremely old and well known in the art and one of ordinary skill in the art would [have] realize[d] that trimming may be done on the resistor of de Wit" (EA5). That something "may" be done does not establish inherency necessary for anticipation. Inherency requires a certainty that an undisclosed function or characteristic is necessarily present. "The mere fact that a certain thing may result from a given set of circumstances is not sufficient [to establish inherency.]" In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981) (citations omitted) (emphasis added). Thus, the anticipation rejection of claims 6 and 2 based on de Wit is reversed for the additional reason that there is no teaching of trimming.

Obviousness

Claims 6 and 2 - de Wit and APA

The Examiner alternatively rejects claims 6 and 2 as unpatentable for obviousness based on de Wit and the APA that trimming was well known. The rejection, as we understand it, is that it would have been obvious to trim the resistor portions in de Wit to achieve a desired resistance and TCR in view the APA description of trimming a precision resistor by trimming a first path portion to a desired resistance and trimming a second path portion to a desired TCR (specification, page 1, line 25, to page 2, line 2). We address only the rejection as stated, which does not rely on the resistor construction in the admitted prior art of Chapel.

Appellants argue that the prior art trimming of the adjustment portion will not work when the TCR of the resistor is already greater than zero because it will simply increase the positive TCR further away from zero (Br6). This argument refers to the problem in Chapel and does not discuss why it would have been unobvious to trim the resistor in de Wit to achieve a desired resistance and TCR in view the APA. While we might speculate that trimming would be difficult for the semiconductor resistor construction in de Wit, in the absence of argument by Appellants we will not conclude that the

Examiner erred. Thus, we conclude that the trimming limitation would have been obvious.

Nevertheless, the obviousness rejection does not cure the deficiency with respect to the lack of showing of first and second resistance "alloy portions," as discussed in connection with the anticipation rejection. For this reason, we conclude that the Examiner has failed to establish a prima facie case of obviousness. The rejection of claims 6 and 2 is reversed.

Claims 3 and 5 - de Wit, APA, and Mcquaid

The Examiner applies Mcquaid to show NiCrAl as a resistance material (FR4). Appellants argue that Mcquaid shows a resistor having one NiCrAl layer and one CrSi layer, whereas for claim 3, "where NiCrAl is chosen, both path portions are substantially the same composition of NiCrAl" (Br8). The Examiner responds that the claims do not require the path portions to have different atomic percentages of elements (EA5).

Since Mcquaid is not applied against claim 6, we will not consider the combination as applied to claim 6. We agree with Appellants that claim 3, which incorporates by reference the limitations of independent claim 6, clearly requires both path

portions to be of "substantially the same composition" with one path portion having a positive TCR and one path portion having a negative TCR. The paths in Mcquaid are made of different compositions, NiCrAl and CrSi. Therefore, assuming, arguendo, that it would have been obvious to replace the semiconductor materials of de Wit with the materials of Mcquaid, the Examiner has failed to establish a prima facie case of obviousness with respect to claims 3 and 5.

Claims 2-6 - Drabkin and Sahagen

Sahagen is applied only to show TiW as a bonding layer. This limitation occurs only in claim 4, which is not argued. Thus, we need only address Drabkin.

Drabkin discloses a precision resistor with resistive material patterns 21 and 22 having opposite curvatures and slopes of TCR characteristics made of nickel-chrome alloys on an electrically insulating substrate (col. 11, lines 19-37). On the side margins 18 of each of these patterns are paths 19 of cut and uncut copper-nickel-gold plated shunts 17 to permit final R (resistance) trimming and shunts 16 to permit final TCR trimming (col. 11, lines 42-46).

The Examiner admits that Drabkin does not disclose that the difference in the resistance values is maximally a factor of 10 and that the difference in the absolute value of TCT is maximally a factor of 10 (EA4). However, the Examiner concludes that "it is [sic, was] well within the level of one of ordinary skill in the art to select resistance and absolute values of the TCR such that a desired result will be achieved, which could be a maximum factor of 10" (EA5).

Appellants argue that the closer initial matching of the resistance and TCR values of the path portions, and the tandem trimming of both sections, allows the resistance value and TCR of the total resistance path to be adjusted more accurately resulting in far fewer rejected resistors and that the rejection does not show how this would have been obvious (RBr3).

We conclude that the Examiner has failed to provide sufficient evidence to establish a prima facie case of obviousness. The Examiner has dismissed the differences (i.e., the difference between the resistance values being maximally a value of 10 and the difference between the absolute values of the TCRs as being maximally a factor of 10)

between Drabkin and the claimed subject matter by saying that selection of the values would have been within the level of ordinary skill in the art. This is a factually unsupported conclusion at the argued point of novelty. While we have no doubt that material selection is within the level of ordinary skill in the art, there is no evidence in the rejection before us that one of ordinary skill in the art would have been motivated to select the differences in resistance values and TCR values to be maximally a factor of 10. In the absence of evidence supporting the Examiner's conclusion, we conclude that the Examiner has not established a prima facie case of obviousness. The rejection of claims 2-6 is reversed.

CONCLUSION

The rejections of claims 2-6 are reversed.

REVERSED

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) BOARD OF PATENT
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